

ATTACHMENT A

EPA COMMENTS ON STORMWATER LOADING CALCULATION METHOD

Document Section	Editorial/Technical Comment	EPA Comment <u>[highlighted comments were discussed on July 3]</u>	Technical Team Resolution on <u>July 3 [agreed to unless otherwise noted]</u>
Global	Editorial	Throughout document there are references to “first round” and “second round” of data. In future documents, all references to “first round” should be changed to “Round 3A” and “second round” to “Round 3B”.	
Global	Editorial	There needs to be a discussion of assumptions used in this assessment (e.g., there is no correlation between activities conducted within a land use and stormwater loading).	
Global	Editorial	In the future, there needs to be a discussion of the uncertainty in this analysis.	
1.0, p.1	Editorial	In future documents, all data used for the study should be noted. Section 1.0 of this document only discusses Round 3A data. It is not until Section 3.0 that the Port of Portland’s data is discussed, and Section 4.0 that the GE data is discussed.	
2.0, p.3	Editorial	The objective of the loading evaluation is to provide data to <i>understand the source, fate and transport of upland stormwater discharges to the Willamette River.</i>	
2.1, p.3 First Bullet	Editorial	Understand <i>relative</i> stormwater...	
2.1.2, p.4 pp. 1, sent. 1	Editorial	Stormwater <i>solids</i> discharges ...	

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2.1.2, p.4 pp. 2, sent. 1	Editorial	...estimates of stormwater <i>solids</i> loads...	
2.2, p.5 pp. 2 (after bullets), sent. 2	Editorial	...estimating these <i>model input</i> loads...	
2.2, p.5	Editorial	It is unclear how stormwater loads will be used to help set sediment PRGs. Please elaborate.	
3.2, p.7 last pp, sent. 1	Editorial	...compounds that are <i>suspected</i> to be a risk driver...	
3.3, p.7	Editorial	This discussion is very confusing as written. For future documents, chemical lists should be limited to actual lists of chemical determined to be needed for each of four bullets with rational or citation to rational.	
4.0, p.9	Editorial	EPA does not agree that direct measurement of all outfalls would require an unreasonably large number of measurements or that there are practical constraints (other than time and resources). The purpose for using representative land-use samples in lieu of sampling every stormwater outfall was to determine generalized pollutant values for land uses. Because this data is being used to determine reasonable estimates of stormwater loads on aggregate to the whole site, rather than individual loads for purposes of source identification and control, it was determined that a reasonable subset of the total storm water outfalls could be sampled to represent various land uses and extrapolated to the whole site.	

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4.1, p.9	Editorial	In future documents, reference that the GE sample collected was similar methodology to the FSP.	
4.1, p.9 1 st bullet	Editorial	...within the overall drainage area <i>to the Site</i> .	
4.1, p.10 3 rd subbullet	Technical	Heavy industrial (20 locations, <i>includes non-unique data from 15 unique locations</i>) <i>representing X percent of the overall drainage to the Site</i> . Need to provide X in future reports.	<u>Agreed to per comment.</u> Yes
4.1, p.10 4 th subbullet	Editorial	Light industrial (five locations) <i>representing X percent of the overall drainage to the Site</i> . Need to provide X in future reports.	
4.1, p.10 1 st bullet	Editorial	...sources that <i>were determined not to be representative of</i> generalized land use measurements. <i>The unique chemicals for each of these sites is presented in Table X.</i>	
4.1, p.10 1 st bullet	Editorial	Future documents should discuss St. Johns bridge and Schnitzer samples from Round 3A, as appropriate.	
4.2.1, p.11 last sent.	Editorial	In this case, the <i>data</i> may be converted to...	
4.2.2, p.11 pp.1	Editorial	It should be stated up front that for this analysis all unique industrial sites are heavy industrial land use.	
4.2.2, p.11 pp.1, sent. 2	Editorial/Technical	In future documents reflect that loading rates for unique sites will be associated with drainage area for the entire property for that upland site.	Yes <u>Agreed to per comment.</u>

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4.2.2, p. 11 pp.2	Editorial	This paragraph is confusing and it is unclear what the “data reduction approach” is. It is believed that this is an attempt to discuss the recategorization of unique and heavy industrial land-use data. This paragraph should be deleted and add following sentence to end of first paragraph: <i>Recategorization of unique and heavy industrial land-use data is discussed further in Section 5.3.</i>	
4.2.3, p.12	Editorial	In future documents indicate that this is discussed further in Section 7.1 (or equivalent section).	
4.3, p.12	Editorial	Estimation of long-term loads does not only involve water samples, but sediment trap samples as well.	
4.3, p.12 pp.1, sent. 2	Editorial	...meet the objectives for the <i>RI/FS because the intent is only to determine generalized pollutant values for land uses rather than to identify actual sources or conduct source tracing.</i>	

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4.3, p.12 pp.1, last sent.	Technical	It is inappropriate to compare whole water loads and solids loads because the partitioning of chemicals between these media will result in vastly differing loading rates. Whole water loads are to be used for relative risk contributions and solids loads are to be used for risk to benthic organisms and recontamination purposes. Solids loads should be calculated from both the whole water data and the in-line sediment trap data and compared to mixed use basin data to determine which is more representative of solids loads to the site.	<u>It was agreed that solids loads from stormwater data could be calculated either using literature values for Kp term or best possible estimates available from limited LWG data on filtered/unfiltered data pairs. Available LWG data that will be evaluated include the Port data on filtered/unfiltered pairs and LWG collected grab sample data. The differences in solids loads calculated from sediment traps versus solids only stormwater loads calculated using the above methods will be evaluated to assess uncertainty of both methods. Based on this uncertainty assessment it will be decided whether to calculate total stormwater loads based on only certain types of data (e.g., stormwater whole water data only).</u> No
4.3, p.12 last pp.	Editorial	In future documents, please elaborate on the tools that are commonly applied to watersheds in the absence of detailed stormwater chemical data and how they will be used to evaluate future changes in source control and land use at this Site.	

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4.3.1, p.13	Editorial	It should be clarified in future documents that this is the method that is used for calculating water loading from whole water samples for the purpose of determining relative risk exposures in the water column.	
4.3.1.1, p.13	Editorial	Runoff volumes will be calculated <i>for each river model cell (Figure 4.2) adjacent to the uplands</i> using the City of Portland Bureau of Environmental Service's GRID model. Additionally, runoff volumes will be calculated for each <i>upland property</i> listed in Table 4-1...	
4.3.1.2, p.13	Editorial	<p>4.3.1.2 Chemical Load</p> <p><i>Chemical water loads</i> will be calculated by multiplying the <i>measured</i> chemical concentration...</p> <p>C_w = Measured concentration ($\mu\text{g/L}$) for land use or <i>unique</i> site</p> <p>V_{month} = Volume of discharge (L/month) from land use or <i>unique</i> site over a month</p>	
4.3.2, p. 13	Editorial	It should be clarified in future documents that this is the method that is used for calculating solids loading from sediment trap data for the purpose of determining relative risk exposures for benthic organisms and recontamination analysis.	
4.3.2.1, p.13	Editorial	Runoff volumes will be calculated <i>for each river model cell (Figure 4.2) adjacent to the uplands</i> using the City of Portland Bureau of Environmental Service's GRID model. Additionally, runoff volumes will be calculated for each <i>upland property</i> listed in Table 4-1...	

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4.3.2.2, p.14	Editorial	...order to relate chemical concentrations (mass of chemical per mass of <i>solids</i>) measured in <i>in-line sediment traps</i> to stormwater <i>solids</i> loading to the Site. Total organic carbon (TOC) concentrations <i>measured in the stormwater solids</i> will be used to normalize the <i>stormwater solids</i> chemical concentrations and determine loads on an organic carbon (instead of TSS) basis. <i>This will be done by multiplying the TOC in stormwater solids by the stormwater solids chemical concentration.</i> Both TOC-based...	
4.3.2.2, p.14	Editorial	Need to explain in future documents the rationale for looking at loading on an OC-normalized basis.	
4.3.2.3, p.14	Editorial	<p>4.3.2.3 Chemical Loading</p> <p><i>Chemical solids loads</i> will be calculated by multiplying the <i>measured stormwater solids</i> chemical concentrations (mass of chemical per mass of <i>solids</i>) by the TSS (mass of <i>suspended solids</i> per volume of ...</p> <p>C_s = Measured concentration ($\mu\text{g/kg}$) for land use or <i>unique</i> site TSS = Total suspended <i>solids</i> (kg/L) in stormwater measured for land use or <i>unique</i> site V_{month} = Volume of discharge (L/month) from land use or <i>unique</i> site over a month</p>	

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4.3.2, p.14	Editorial	Need discussion of calculating chemical loads from whole water samples using the following equation. $L_{s,w} = C_{s,w} * V$ $C_{s,w} = C_w * X_s$ $X_s = 1 - [1 / (1 + K_p * TSS)]$ $K_p(\text{metals}) = \text{see above}$ $K_p(\text{organics}) = K_{oc} * X_{oc}$ $K_{oc} = -0.54 \log S_w + 0.44$ $X_{oc} = 1 - DOC/TOC$ $L_{s,w}$ = Solids load from water data (ng/d) $C_{s,w}$ = Concentration sorbate in solids (ng/L) X_s = Sorbed fraction S_w = water solubility of sorbate X_{oc} = mass fraction OC in solids C_w = Total whole water concentration (ng/L) V = Volume of discharge (L/month) from land use or unique site over a month	<u>Agreed to as noted in Comment 4.3, p.12 pp.1, last sent.</u>
5.0, p.15	Editorial	In the future, need to include discussion of whole water-based solids loading.	
5.0, p.15 step 3	Editorial	3. <i>Recategorization of Data</i> (Section 5.3) – <i>This section provides the process</i> to evaluate Unique and Representative Heavy Industrial <i>data on a chemical-specific basis</i> to identify <i>which data</i> could be reclassified from Unique to Representative or from Representative to Unique.	
5.0, p.15 step 4	Editorial	...evaluated for the presence of outliers for each land use category...	
5.1, p.18 3 rd line	Editorial	...be included <i>in land use data sets</i> as follows	

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5.1, p.18 1 st bullet, last sent.	Editorial	<i>Otherwise</i> , the St. John's Bridge data <i>will</i> be combined with the major transportation data.	
5.1, p.18 2 nd bullet	Editorial	In future documents need to discuss fate of this data.	
5.1, p.18 pp.2	Editorial	Remove "...and explained further in Section 5.3.1.1." since there is no section in this document.	
5.2, p.19	Editorial	Title should be "Handling of Duplicates and Replicates" since both are discussed in this section.	
5.2, p.19 pp.2, sent. 1	Editorial	Need to define "relatively consistent".	

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5.2, p.19 pp.2 5.2.1 & 5.2.2	Technical	<p>For all future analyses, the process for evaluating field duplicates and lab replicates should be as follows:</p> <ul style="list-style-type: none"> • Compute relative percent difference (RPD) for each normal/duplicate and normal/replicate data pair. Relative percent difference (RPD) is a measure of precision, calculated by: $RPD = [X1 - X2] / X_{ave} \times 100$ where: X1 = concentration in normal sample; X2 = concentration in field duplicate or lab replicate; and Xave = average concentration = $[(X1 + X2) / 2]$ <p>If the RPD is greater than levels presented in Table 4.2 of the <i>Portland Harbor RI/FS Round 2 QAPP Round 3A Stormwater Sampling</i>, January 19, 2007, then the samples will be determined to be divergent and will need to undergo an outlier analysis <u>as described in the next bullets.</u></p> <ul style="list-style-type: none"> • For divergent samples, conduct further investigation with field and lab staff and notes to determine any reasons for divergence. Data pair or individual data point may be segregated from data set if a substantial reason exists for divergence, depending on reason. This will require BPJ. • If no substantial reason for divergence can be found, compare data pair to other data points in the corresponding land use category. If the data pair is found to be with the range of data for that land use, then average the duplicate or replicate results with the corresponding normal sample. If either data point in the data pair are outside the range of data points in the corresponding land use category, then segregate data pair from 	<p><u>Agreed to per redline edit shown in EPA comment column.</u>Yes</p>

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5.3, p.21	Editorial	The objective of this section is to evaluate the data for each land use to confirm that the data appropriately represents the land use.	
5.3.1, p.21 pp.1, sent.3	Editorial	...industrial sites were categorized as Unique <i>for certain chemicals</i> , anticipating that <i>this data</i> would not be used in...	
5.3.1, p.21 pp.2	Editorial	...quantitative and qualitative (<i>e.g.</i> , graphical) methods to evaluate <i>on a chemical-specific basis</i> whether the unique <i>and</i> heavy industrial <i>data sets</i> contain outliers that could be reassigned (<i>e.g.</i> , <i>unique to heavy industrial or heavy industrial to unique</i>).	

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5.3.1, p.21	Technical	<p>For all future analyses, the process for evaluating land use data should be as follows:</p> <ul style="list-style-type: none"> • Enter data for land use into ProUCL 4.0, including ND. For data sets with NDs, ProUCL can create additional columns to store extrapolated values for NDs obtained using regression on order statistics (ROS). • Use ProUCL to conduct goodness-of-fit (GOF) tests to determine distribution of data. • Use ProUCL to conduct outlier tests. Outliers for heavy industrial land use will be recategorized as unique data if backed up by general information about the site activities and COI that would lead to such a conclusion. Outliers for other land uses will be retained in data set, but noted in conclusions discussion and uncertainty analysis. (This replaces discussion in Section 5.3.2) • Use ProUCL graphical displays to present histograms, Q-Q plots, and box plots. • Use ProUCL to present Summary Statistics and Estimates of Population Parameters for data set. 	<p>Partial Yes—only for use of ProUCL for ND and GOF <u>Agreed to overall process as described in comment. Some details of ND analysis methods and sequence of data analyses steps may be superseded by previous meeting agreements.</u></p>

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5.3.3, p.22	Technical	<p>The objective of this section is to review data categorized as Unique site data (see Table X) to determine if it should be recategorized as Heavy Industrial land use for each chemical. For all future analyses, the process for evaluating recategorization of unique and heavy industrial data should be as follows:</p> <ul style="list-style-type: none"> Compare unique for each unique site data for each chemical to heavy industrial land use data for corresponding chemical. If all data for a chemical at a unique site fall within the range of data for the heavy industrial land use, then recategorize data. Otherwise, data is retained as unique. <u>If unique site is outside representative range on either high or low end, then the site remains unique.</u> Ensure that decision to recategorize data is backed up by general information about the site activities and COI that would lead to such a conclusion. 	<p>Clarification to the second of the three bullets is suggested. This second bullet was tentative agreed to but there were LWG concerns that it may be too simple as compared to the previously proposed methods. The LWG indicated they wanted to pose this comment to statisticians not available during the call to determine final LWG agreement.</p>
5.3.4, p.28	Technical	In the future, do not conduct reclassification evaluations in this section.	<u>Agreed to per comment.</u> Yes
5.4, p.30	Technical	In the future, do not conduct the detailed outlier analysis in this section.	<u>Agreed to per comment.</u> Yes

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5.6, p.34	Technical	In the future, do not conduct the evaluation in this section since it is redundant with Section 5.3.1-	<u>It was agreed that there are two steps to the ND analysis, but both steps would follow the approach as noted in the comment on Section 5.3.1, subject to agreements also noted above for Section 5.3.1.</u> Yes
5.7, p.37	Technical	In the future, use ProUCL to present Summary Statistics and Estimates of Population Parameters for data set (see comment for Section 5.3.1). <u>Fine with this.</u>	<u>Agreed to per comment.</u> No
6.1, p.41	Editorial	It should be noted in future documents that there is uncertainty in the TSS data that could be due to the various BMPs for solids control throughout the site.	
6.1.1.2, p.42 pp.1	Technical	Remove last two sentences in this paragraph. It is inappropriate to determine data is an outlier using data collected outside of this analysis because the data was not collected for the same purposes, within the same location (i.e., within the Site), or using the same methodology. The process presented for Section 5.3.1 provides the appropriate methodology to use to determine outliers for TSS data.	<u>Agreed that TSS data should not be segregated based on this analysis, but rather this analysis would be presented and discussed as part of the uncertainty analysis.</u> No <u>TSS data would be evaluated consistent with the outlier/reclassification analysis as noted above, and only in these cases would TSS data be segregated.</u>
6.2, p.42	Technical	The in-line solids data set for each land use is too small to determine outliers or distribution on a quantitative (or statistical) basis. A qualitative analysis for outliers may be conducted.	<u>Agreed to per comment.</u> No

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6.4, p.43	Technical	The TSS data measured in water and the TOC data measure in solids will be used to determine solids loading.	<u>It was agreed that these data would be used and in addition TOC in water would also need to be used to calculate an OC normalized load.</u>
6.4, p.43 pp.1, sent.1	Editorial	<i>Stormwater solids</i> loading to the Site...	
6.4, p.43 pp.1, sent.4	Editorial	...each case, the chemical concentrations in the sediment trap (either bulk <i>solids</i> or on...	
6.4, p.43 pp.2	Technical	Delete last two sentences; there has not been enough study of these basins or other basins with the Site to determine TSS and concentration correlation, how likely maximum values occur simultaneously, or whether the data collected is in fact the maximum values that are likely to occur at the Site. Other studies have shown that there is no correlation between TSS and concentration. For the purposes of this analysis, it would be best to look at central tendency and worst case scenarios. Further, each sediment trap is a central tendency for that stormwater basin; thus, it would be appropriate to use the central tendency of TSS data from that basin for the analysis (i.e., take averages of TSS for each basin and then run statistics on the resulting values for land use loading calculations).	No <u>It was agreed that the “worst case” calculation would be conducted. It was also agreed that the text will need to address the level of conservatism represented by these estimates and place the estimates in the appropriate perspective so that end users (e.g., in-river modelers) can use them appropriately.</u>
7.0, p.44 pp.1	Editorial	...comparison of stormwater <i>solids</i> loading concentrations...	

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7.1, p.44	Editorial/Technical	This section is acceptable for discussion of stormwater loads, but future analyses need additional section for discussion of stormwater solids loads. There should be a comparison of stormwater solids load calculated from whole water data, stormwater solids load calculated from sediment trap data with comparable mixed use basin solids loads. <u>Covered by previous agreement.</u>	<u>Covered by agreement noted above for Comment 4.3, p.12 pp.1, last sent.</u> No
7.1, p.44	Technical	In the future, this comparison should be conducted for range of data points (e.g., minimum, average and maximum) to have enough information to determine if the land use extrapolation method is within the realm of loads calculated for mixed-use basins.	No <u>Agreed to per comment.</u>
7.2, p.45	Technical	In the future, do not conduct the detailed analysis in this section.	No <u>Agreed that the comparison would be conducted per the agreements on uncertainty analyses for previous comments.</u>
Table 3-1	Editorial	In the future, present two tables; one for whole water and another for solids since the analytes measured for each media were not the same due to sample size.	
Table 3-2 footnote 3	Editorial	...the fact that the bridge was recently <i>repaved and repaired</i> .	

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Table X. Chemicals for Unique Sites – See update to June 26 agreements for additional July 3 agreements on this table.

Outfall #	Facility/Location	Unique Chemicals
WR-22	OSM	PCBs, PAHs, phthalates, metals
WR-123	Schnitzer International Slip	PCBs, phthalates, metals
WR-384	Schnitzer - Riverside	Metals
WR-107	GASCO	PAHs
WR-96	Arkema	Pesticides, phthalates
WR-14	Chevron - Transportation	PAHs

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WR-161	Portland Shipyard	PAHs, phthalates, metals
WR-4	Sulzer Pump	PAHs, metals
WR-145	Gunderson	PCBs, PAHs, phthalates, metals
WR-147/148	Gunderson (former Schnitzer)	Phthalates, metals
	GE	PCBs

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